Impact of Dental vs. Medical Presentation Perspective on Parental Acceptance of the Human Papilloma Virus Vaccination

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The human papilloma virus (HPV) vaccination is a powerful but under-utilized tool in the fight against HPV-related cancers. As with most vaccines, its uptake is primarily dependent on parents accepting the vaccination for their children; however, the HPV vaccination has shown significantly reduced uptake when compared to other childhood vaccinations. This study reports the significant differences in parental acceptance of the HPV vaccination when the vaccination is presented from a medical or dental perspective in parents of children 7 to 17 years of age. OBJECTIVE: This study aims to evaluate whether parental acceptance of the HPV vaccine increases when it is presented from a dental perspective in the context of oropharyngeal cancer rather than from the traditional medical perspective. METHODS: A three-part, 27 question survey was administered online to interested parties requesting the survey link. Significant association was tested for between demographic categories and for differences in acceptance between the medical and dental pamphlets presented as part of the survey using Wilcoxon signed rank test, chi-squared analysis, Fisher's exact test, and paired T-test analysis along with descriptive statistics. RESULTS: The medical pamphlet was significantly associated with increased parental acceptance of the HPV vaccination ($p=0.035$). Increased parental education was also associated with increased parental acceptance of the HPV vaccination after reading the dental pamphlet, while increased child age was associated with decreased parental acceptance of the HPV vaccination after reading the medical pamphlet. CONCLUSIONS: As children age, parental acceptance of the HPV

vaccination decreases. Overall parental acceptance of the HPV vaccination was significantly higher when it was presented from a medical perspective.

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1.0 Review of the Literature

Human papilloma virus (HPV) is the most common sexually transmitted infection in the United States (US) and is responsible for a variety of cancers, including cervical and oropharyngeal (Emberger, 2015).[1] With the advent of vaccines against a variety of high risk HPV strains, there now exists a cancer-preventative vaccine for both men and women. In the US, it is currently estimated that there are 34,800 cases of cancer per year with HPV as the causative agent; of these, 32,100 cases could be prevented by the most recent 9-valent HPV vaccine (Walker et al. 2019).[2] Despite the obvious appeal of a vaccine that prevents specific types of future cancer, the uptake of the HPV vaccine has been far lower than for other vaccinations (only 51% in the US for the 2017 to 2018 year), and its uptake has plateaued in females (Walker et al., 2019).[2] Reduced uptake is due in part to the sexual nature of the disease and the adolescent age range the vaccine targets. This study examines whether parental acceptance of the HPV vaccine is influenced by its presentation from a medical or from a dental standpoint.

1.1 Current Vaccine Recommendations and HPV Facts

Current vaccine recommendations by the Centers for Disease Control (CDC) include vaccination for boys and girls of 11 and 12 years of age (although the schedule may begin as early as 9 years old), with catch-up vaccinations for those individuals up to 26 years old (Meites et al. 2019).[3] There is a two-dose vaccine schedule for those individuals who start the series prior to

15 years of age, and a three-dose schedule for those starting between 15 to 26 years of age (Meites et al., 2016).[4] The HPV vaccination was recently licensed for use in individuals up to and including 45 years of age who have, through shared clinical decision making with their doctor, decided that they might benefit from vaccination against HPV (Mietes et al, 2019).[3] The current vaccine available is nine-valent and consists of a noninfectious virus-like particle (VLP) (Petrosky et al., 2015).[5] Recently, studies have shown that HPV is becoming increasingly linked to oropharyngeal cancer (OPC), which in 2015 became the most common HPV-associated cancer in the United States, thus elevating its significance to the dental profession from the lowly intraoral wart to being associated with a life-altering diagnosis (Villa et al., 2019).[6] In 2013, Curado et al. reported that HPV, especially high-risk type 16, is the cause in up to 70% of oropharyngeal cancers, and that HPV infection produces a 50-fold increase in one's risk for oropharyngeal cancer (Curado et al., 2013 and Sastré-Canton et al., 2019).[7,8] This trend has only increased, with Kepka et al., 2019, reporting that HPV is responsible for between 70-90% of oropharyngeal cancers (Kepka et al., 2019).[9] These HPV-positive OPCs are appearing in younger populations than those traditionally associated with oropharyngeal cancer. It has also been shown that in persistent HPV cases of the oropharynx, that most of the infections were caused by high-risk HPV strains that the vaccine offers coverage against (Sastre-Canton et al., 2019).[8]

1.2 Barriers to Vaccine Discussions with Dentists

As the sexually associated aspects of the HPV vaccine present as difficult conversations for many parents, there may be merit to disengaging the topic from the sexual connotations of

cervical cancer and instead relating it to oropharyngeal cancer in a setting (the dentist's office) where sexual health is an uncommon topic. Previously, studies have demonstrated that strong provider and professional organization recommendations are one of the primary influencing factors in helping parents choose to vaccinate, and this holds true for the HPV vaccine (Walker et al., 2019; Gonik, 2006).[2,10] Because of the oropharyngeal ramifications of contracting HPV, discussing the subject should not be deemed taboo amongst oral health professionals. Despite this fact, however, approximately only half of parents of 11 to 17 year-olds felt comfortable with dentists making a recommendation concerning the HPV vaccine (Lazalde, et al., 2018).[11] Dibble, et al. recognized that addressing and eliminating these preconceived notions over who is responsible for or eligible to initiate HPV discussions could provide a path to greater vaccine acceptance and uptake (Dibble, et al., 2019).[12] Indeed, these trepidations over dentists becoming involved with the HPV vaccine, both by providing recommendations for its use and by providing the vaccine itself, are not exclusive to parents; they exist amongst dentists as well. When surveyed, 97% of a cohort of dentists identified as being in the pre-contemplation stage with regard to discussing HPV in their offices (Daley, et al.).[13] It should be noted that the majority of this particular cohort of dentists consisted of white males over the age of 50 who represent an older generation of dentists that have not viewed HPV as within their purview. Studies targeting oral health students, who represent the future of dentistry, report that most of those surveyed viewed HPV discussions as within the scope of practice and were willing to train and administer the HPV vaccination (Kepka, et al., 2019).[9] Barriers to willingness to train concerning HPV and the HPV vaccine include the following items: 1) recommendation of the vaccine is not the duty of the

oral health provider; 2) perceived lack of time; 3) outside of the scope of dental practice; and 4) uneasiness or discomfort discussing HPV (Kepka et al., 2019).[9]

As discussing HPV in the office is perceived as a widening of the scope of practice for some dentists, it should be addressed as any other new addition to practice with continuing professional education about the topic of HPV and availability of professional literature available for dentists to provide to their patients (Kline et al., 2018).[14] Dentists also cited a desire for increasing public awareness of, and literacy about, HPV as a major perceived need for discussing HPV with patients (Kline et al., 2018).[14] Hygienists also offer another avenue to introducing discussions concerning HPV and the HPV vaccine in the dental practice. This approach could help eliminate some of the barriers cited by dentist such as not having enough time to discuss the topic with patients. According to Thompson et al., hygienists are very interested in being able to provide good discourse with patients and their parents on the subject of HPV, but they currently lack knowledge of the virus (Thompson et al.).[15] Hygienists wished to have more continuing education regarding the subject so they could better approach this expanding role. Pediatric dentists are in a prime position to help educate patients and parents about the HPV vaccine. Most pediatric residency directors are in favor of teaching the subject in the curriculum, but currently, residency programs offer little education about it (Hosking et al., 2017).[16]

1.3 Barriers to Vaccination for Parents

One of the frequently cited reasons for low uptake of the HPV vaccine is that many parents believe that their child is sexually inactive, or that administration of the vaccine will

encourage their child towards an early sexual debut or to engage in an increased number of sexual encounters (Dibble et al., 2019).[12] Parents of females in particular cited concerns over increased sexual promiscuity if their daughters were to be vaccinated as a barrier to uptake for the HPV vaccine whereas the primary barriers cited for males in this study were that parents were unaware that males could receive the vaccine and of reasons males should receive the vaccine (Oldach and Katz, 2012).[17] There is little evidence to support the idea that the HPV vaccine promotes sexual encounters and promiscuity in those who receive it. In college students in Michigan, no increase in sexual encounters was found for students who had received the HPV vaccination as opposed to those who had not (Brouwer et al., 2019).[18] One possible way to surmount this incorrect perception is to begin discussing the HPV vaccine years prior to its scheduled administration. This can open a dialogue between the parent and the provider so that questions may be answered and that the vaccine is seen as more routine when the time comes. This early dialogue goes hand in hand with the aforementioned strong provider recommendation that has been shown in numerous studies to increase vaccine acceptance and uptake.

2.0 Purpose

The purpose of this study is to evaluate whether acceptance of the HPV vaccine varies in parents of children 7 to 17 years old when the vaccine is presented to them from a dental perspective in the context of oropharyngeal cancer rather than from a medical standpoint in the context of cervical, anal, penile, and vulvar cancer. It is hypothesized that parental acceptance of the HPV vaccination will increase when it is presented to parents from a dental perspective as a consequence of the fewer inherent sexual connotations associated with oropharyngeal cancer as compared with cervical, anal, and penile cancers. A secondary aim of this study is to explore whether parental comfort levels with provider recommendation for the HPV vaccination differ between medical and dental provider recommendations. Additionally, this study will identify areas for potential growth in promoting the vaccination to increase its uptake. This study seeks to accomplish these aims by evaluating the demographic information collected for both parents and children and analyzing whether a particular feature correlates with increased or decreased acceptance of the vaccination.

3.0 Materials and Methods

The protocol for this research was approved by the IRB at the University of Pittsburgh in Pittsburgh, Pennsylvania on April 10, 2020.

3.1 Procedure

Participants for this study were recruited through the *Pitt+me* program, which is a database hosted by the University of Pittsburgh where individuals who have previously submitted demographic information and study interests upon registering are able to volunteer for research studies advertised in the database. Advertisements for this study were posted in two different groups: adult registry recruitment and pediatric registry recruitment (children aged 7 to 17). Interested individuals then were able to request a survey link be sent to them via email. To be eligible for study participation, recruits were required to be parents of a child between the ages of 7 and 17 who could read and write in English and were willing to participate in the study. Prior to requesting the survey link, prospective recruits were informed that two eligible participants who voluntarily entered the drawing at the completion of the survey would be selected randomly for receipt of one two $50.00 amazon.com gift cards sponsored by the Department of Pediatric Dentistry, of the University of Pittsburgh School of Dental Medicine. Individuals who requested survey links were randomized into one of two groups before being sent the survey corresponding to their appropriate randomization. These groupings

corresponded to whether the participant would first see the Immunization Action Coalition ("red") pamphlet or the American Dental Association ("green") pamphlet when completing the survey and were specifically designed to assist in eliminating bias from the study. Recruits were then asked to consent to the survey before beginning it. All survey responses were collected anonymously and online through *REDCap*, a data collection software hosted by the University of Pittsburgh Clinical and Translational Science Institute (CTSI). Prospective participants were made aware prior to requesting the survey link that two individuals who completed the survey in its entirety and opted in to the contest would be entered into a drawing for one of two $50.00 amazon.com gift cards to be awarded at the completion of the study.

Individuals requesting a survey link were emailed the consent and survey link corresponding to their randomized group as shown in Appendix A.

3.2 The Survey

The data collection instrument (hereafter "the survey") was developed specifically for this study and was comprised of 27 questions divided into three sections: (1) demographic information and initial assessment; (2) two pamphlet readings and corresponding questions; and (3) comparative questions and final intention questions. In the first section, the demographic questions pertained to both the parent completing the survey and the parent's youngest child between the ages of 7-17 years. The questions assessed information such as the parent's age, gender, education level, and their baseline knowledge of the human papilloma virus (HPV) and

the human papilloma virus vaccination as well as information about the child's age, sex, HPV vaccination status, dental provider type, and frequency of dental visits.

The second section of the survey asked parents to read two different pamphlets about the HPV vaccine (one published by the Immunization Action Coalition and the other published by the American Dental Association) and answer questions about their perspectives following the readings. These pamphlets were selected with the objective of ensuring that they were comparable in terms of ease of understanding and level of detail. To minimize bias, participants were randomized into two different groups, one of which was assigned to read the Immunization Action Coalition (IAC) pamphlet first, and the other which was assigned to read the American Dental Association (ADA) pamphlet first. Following these readings, parents were asked to evaluate their acceptance of the HPV vaccination for their child with regards to each specific pamphlet as well as the parent's view of the appropriateness of each type of provider discussing the HPV vaccination with them. Following the pamphlet released by the ADA, parents were also assessed on their previous knowledge of HPV's relationship with oropharyngeal cancer.

The survey's third and final section evaluated parents' views and intentions concerning the HPV vaccination after reading both pamphlets. This asked parents to compare the pamphlets for several different metrics as well as asked them to identify whether the medical or the dental pamphlet was the more influential. Parents also were asked about their overall willingness to consider the HPV vaccination following these readings and to specify their reasons if they were unwilling to vaccinate their children.

The complete survey with the IAC pamphlet shown first is found in Appendix B. Please note that in the survey, the pamphlet released by the IAC is referred to as the "Red Pamphlet"

(Appendix C), and the pamphlet released by the ADA is referred to as the “Green Pamphlet” (Appendix D).

3.3 Statistical Methods

Data collection began in April, 2020, and ceased in December, 2020. The collected data was analyzed with SPSS software using descriptive statistics, paired t-tests, Chi-squared analysis, Wilcoxon signed rank test, and Fisher’s exact test to accomplish the following aims:

1) To characterize the reported demographics for both parents and children addressed in the study. Variables described include the following: subject age, gender, and race/ethnicity; child’s sex and age; parent education level; payment method for child’s dental appointments; child’s type of dental provider; and frequency with which child visits their dental provider.
2) To evaluate subject’s pre-existing knowledge of HPV and the HPV vaccination in addition to their child’s vaccination status and the subject’s pre-survey level of consideration about vaccinating their child against HPV.
3) To evaluate degree of parental agreement with and acceptance of the survey pamphlets and their contents using Likert scale questions to help determine likelihood of parental vaccine acceptance following pamphlet readings.

4) To determine whether there are associations between increased vaccine acceptance and the demographic and preliminary knowledge variables addressed in part one of the survey.
5) To evaluate whether the presentation of the HPV vaccine from a medical or dental perspective impacts parental acceptance of the vaccination.

P-values of less than or equal to 0.05 were considered significant for Fisher's Exact test, Chi-squared analysis, and for paired T-tests. Some categories were merged to create fewer groupings during statistical analysis. Parent education level was recategorized into two (less than or equal to a high school diploma/GED and a 2- or 4-year college degree or greater education level) and three category (less than or equal to a high school diploma/GED, a 2- or 4-year college degree, or a Master's or doctoral level degree) sections. Parental age was grouped into less than or equal to 35 years of age, 36-45 years old, and 46 years and older. Children aged 7 to 9 were not included in the statistical analysis for whether or not the subject's child had yet received the HPV vaccination as children under the age of nine years are not approved to receive the vaccination, and children who are nine years of age are acceptable HPV vaccine candidates only under special circumstances. Parent sex was not utilized for statistical analysis as only six (6) males were part of the sample as compared to the 190 females.

4.0 Results

A total of 346 people from the *Pitt+me* database requested survey links; of these 346 people, 206 consented to and began completing the survey, yielding a response rate of 59.5%. Of the 206 participants who began completing the survey, 196 people completed the survey in its entirety yielding a survey completion rate of 95.1%. Approximately seven people emailed the co-investigator requesting a new survey link after unintentionally ending the survey early or after finding the survey link sent to them already counted their response as complete before they had completed it. Due to limitations with the software and study design, new links could not be sent out, and any incomplete surveys were excluded from final statistical analysis. After accounting for these discrepancies, the corrected overall response rate for the survey was 61.5%.

Aims 1 and 2 as discussed in the materials and methods section address results obtained from Section 1 of the survey and detail the parental demographics that are described herein. Of the 196 respondents, 190 were female and 6 were male. The 196 participants' race/ethnicities had the following distribution: 91.8% Caucasian (n=180); 6.6% African American (n=13); 2.6% Hispanic (n=5); 0.5% Native American (n=1); 0.5% Asian-Pacific Islander (n=1); and 0.5% other (n=1). The parental age distribution was as follows: 56.1% of parents (n=110) were between 36 and 45 years of age; 26.0% of parents (n=51) were 46 years old or older; 16.8% of parents (n=33) were between 26 and 35 years of age; and finally, 1.0% of parents (n=2) were 25 years or younger. Parental education was distributed as follows: 48.5% of parents had a 2-year or 4-year college degree (n=95); 35.7% of parents had a master's or doctoral degree (n=70); 13.8% of parents had a highs school diploma or GED (n=27); and 1.0% of parents had less than a high school diploma

(n=2). Of the 196 parents responding, only two selected “prefer not to answer” as their response when asked for their level of education. When asked to report their child’s age, the breakdown of parent responses was as follows: 44.9% reported their child was between 7 to 9 years of age (n=88); 31.1% reported their child was between 10 to 12 years of age (n=61); 15.3% reported their child was between 13 to 15 years of age (n=30); and 8.7% reported their child was between 16 to 17 years of age (n=17). When asked if their child was male or female (specifically, the sex assigned at birth), 57.7% of parents (n=113) responded that their child was female, and 42.3% of parents (n=83) responded their child was male. When asked how often their child typically visits the dentists, parents reported the following: 86.2% reported their child visits the dentist every 6 months (or approximately twice a year) (n=169); 7.7% reported their child visits the dentist every 6 to 12 months (or approximately once a year) (n=15); 5.1% reported their child visits the dentist every 12 to 18 months (or approximately less than once a year, but at least every 18 months) (n=10); and 1.0% reported that their child only visits a dentist if there is a problem or issue (n=2). The distribution of parents who took their children to a general dentist versus a pediatric dentist was almost evenly split, with 51.5% of parents (n= 101) taking their child to a general dentist and 48.5% of parents (n=95) taking their child to a pediatric dentist. Most parents (73.7%; n=143) paid for their child’s dental visits using private dental insurance, and the remaining parents reported they pay for their child’s dental visits as follows: 13.9% reported they paid using Medicaid (n=27); 7.7% reported they paid using CHIP (n=15); and 4.6% reported they were self-pay (n=9). There were two missing responses for the question asking how parents typically paid for their child’s dental visits, but these responses were regarded as random missing data and therefore were not excluded from analysis.

Almost all (98.5%; n=192) parents reported they had heard of the HPV vaccination. Only 1.5% of parents (n=3) reported they had not heard of the vaccination. When asked where they had heard of the HPV vaccination, 69.4% of parents (n=136) reported they had heard of the vaccination from a pediatrician/primary care provider, 41.8% of parents (n=82) reported they had heard of the vaccination from someone other than a pediatrician/primary care provider or a dentist, and only 1 parent reported they had heard of the vaccination from a dentist (0.5% of parents).

The distribution for child HPV vaccination status was as follows: 22.4% of parents (n=44) answered that their child had already received the HPV vaccination; 72.4% of parents (n=142) answered that their child had not yet received the HPV vaccination; and 5.1% of parents (n=10) did not know if their child had received the HPV vaccination. Parents who responded that their child had already received the HPV vaccination (n=44) were directed out of the survey as they could not adequately respond to how the pamphlets shown later in the survey would impact their decision on whether they would accept the HPV vaccination for their child; these survey responses were still counted as complete and were included in statistical analysis. When asked if they were considering the HPV vaccination for their child, 60.5% of parents (n=92) reported they were considering the HPV vaccination for their child, 15.1% of parents (n=23) reported they were not considering the HPV vaccination for their child, and 24.3% of parents (n=37) reported they were undecided about whether they were considering the HPV vaccination for their child. Parents were also given a question assessing their baseline knowledge concerning HPV. Only 19.9% of parents answered the question correctly in its entirety (n=39). Almost all parents

(96.4%; n=189) correctly included cervical cancer as an HPV-associated cancer, and only 4.6% of parents (n= 9) incorrectly selected lung cancer as an HPV-related cancer.

A Wilcoxon Signed Rank test was used to evaluate differences in parental acceptance of the HPV vaccination after parents read both the IAC and the ADA pamphlets. This test was chosen after the data collected was found to have a non-parametric distribution as demonstrated by the box plots (see Figure 1). Using this test, the null hypothesis was rejected, and parental acceptance of the vaccine was found to be significantly higher after reading the IAC pamphlet than after reading the green pamphlet (P=0.035). A total of 152 parents completed the survey, but for this statistical analysis, those 16 individuals who marked "undecided" for these questions as their answer of choice were omitted from statistical analysis as the study was designed to utilize the "undecided" option as a means to eliminate missing data.

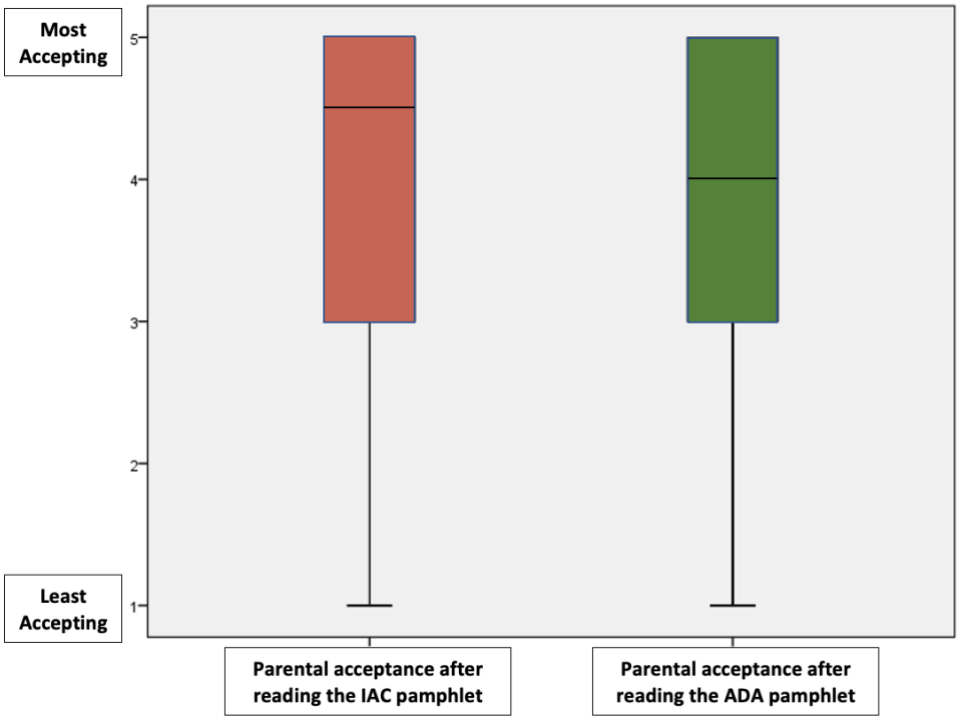


Figure 1 Box plot describing parental acceptance of the HPV vaccination after reading both pamphlets.

Further analysis showed a statistically significant association between child age and parental acceptance of the HPV vaccination after reading the IAC pamphlet as well as a statistically significant association between parent education (when evaluated from a three-category perspective) and parental acceptance of the HPV vaccination after reading the ADA pamphlet ($p=0.030$ and $p=0.021$, respectively). Increased parental education also showed higher parental acceptance of the HPV vaccination after reading the IAC pamphlet, but the values were not statistically significant. A similar trend to the statistically significant relationship between child age and parental acceptance of the HPV vaccination after reading the IAC pamphlet is seen between child age and parental acceptance of the HPV vaccine after reading the ADA pamphlet, and both trends show parental acceptance of the HPV vaccination decreasing with increased child age. When evaluated, parents of 7 to 9 year olds were most accepting to the vaccination for both the IAC and the ADA pamphlets, with 80.2% of parents of 7 to 9 year olds accepting the vaccination after reading the IAC pamphlet and with 72.8% of parents of 7 to 9 year olds accepting the vaccination after reading the ADA pamphlet.

No statistically significant association was found between child sex, parental age, or type of dental insurance and parental acceptance of the HPV vaccination after reading either the IAC or ADA pamphlet. Over half of parents reported taking their children aged 7 to 9 to the pediatric dentist. As children got older, parents were more likely to take their children to the general dentist. Almost all parents took their children to the dentist every six months.

The Likert scale questions were designed with an “undecided” option to help eliminate missing data and incomplete surveys for participants who felt uncomfortable assigning a value such as “neither likely nor unlikely to accept” when answering questions. Consequently,

participants who answered “undecided” were excluded from statistical analysis. Participants who selected “neither likely nor unlikely to accept” were grouped as not accepting of the vaccine for their child during statistical analysis. Overall, this method of eliminating parents answering “undecided” and grouping those selecting the “neither” option as not accepting worked well for assessing parental acceptance levels; however, this method imposed some limitations on the analysis by obscuring individual movement between the grouped and excluded categories. This must be considered as a jump from “definitely will not accept” or “probably will not accept” to “neither likely nor unlikely to accept” or “undecided” represents a positive outcome towards increasing parental acceptance of the vaccination; conversely, moving to “neither likely nor unlikely to accept” or “undecided” from an original response of “definitely will accept” or “probably will accept” represents a negative outcome for the goal of increasing parental acceptance. These nuances are lost with the grouping and elimination methods selected for the majority of this analysis.

Parents who selected the “no” option when asked if they intended to obtain the HPV vaccination for their child after reading both pamphlets were asked to also select their reason(s) for not choosing the vaccination for their child. Of the 15 parents answering the question, 13 parents responded that they had concerns about the safety of the vaccine. Only two parents cited fears that the vaccine would encourage their child to engage in sexual activity as their reason for not vaccinating, and three parents they did not intend to vaccinate their child because their child is sexually inactive. Equal numbers of parents (n=1 for each group) reported the following reasons for not intending to vaccinate their child: that their child was male or that their child’s

pediatrician had not made a recommendation concerning the HPV vaccination. Finally, seven parents selected “other” as a reason for not intending to vaccinate their child.

5.0 Discussion

5.1 Which Pamphlet Most Influenced Parental Acceptance?

Results from the study revealed a statistically significant difference between parental acceptance for the HPV vaccination after reading the IAC pamphlet and after reading the ADA pamphlet. Specifically, parents were more accepting of the HPV vaccination after reading the IAC pamphlet than after reading the ADA pamphlet when analyzed using a Wilcoxon signed rank test for non-parametric data as opposed to a paired T-test for parametric data. This type of analysis was selected after the data distribution was analyzed and was found to have multiple ties and discrete distribution as opposed to the normal Gaussian distribution. That parents had increased acceptance after reading the IAC pamphlet is counter to the original hypothesis of this study, which posited that parental acceptance of the HPV vaccination would be higher after reading the ADA pamphlet as it presents the HPV and the HPV vaccination from the perspective of oropharyngeal cancer, which has fewer inherent sexual connotations than do the cervical, anal, and penile cancers addressed in the IAC pamphlet. It was proposed that the sexualization of the HPV vaccination in its traditional marketing was contributing to its low uptake as parents may be unwilling to consider their child would have need of such a vaccination. One possible explanation for this finding is that parents may be unaware or less informed of the serious consequences associated with oropharyngeal cancer than they are with the cancers discussed in the IAC pamphlet. Increasing awareness of both oropharyngeal cancer and its relationship with HPV may

help close the gap in how presentation of the HPV vaccination from a dental standpoint can increase parental acceptance of the vaccination for their children.

5.2 Which Demographic Factors Most Influenced Parental Vaccine Acceptance?

Predictably, increased parental education was significantly associated with increased acceptance of the HPV vaccination, which is consistent with current vaccine literature. Interestingly, however, this association was not significant across both pamphlets. Only the ADA pamphlet had a statistically significant association between vaccine acceptance and increased parental education (when education was split into three categories), although the IAC pamphlet and the ADA pamphlet split into two categories did show a trend towards increased parental acceptance with increased parental education ($p=0.021$). One explanation for this difference could lie in the parents' perceived ease of understanding between the two pamphlets. Although over half of parents responding (55.0%) found that both pamphlets were equally easy to understand, which was an intentional goal during pamphlet selection, 27.8% felt that the IAC pamphlet was easier to understand than the ADA pamphlet. Consequently, parents with higher education levels may have been more comfortable understanding the ADA pamphlet. Differences in understanding of the two pamphlets may have arisen from formatting difference, with the IAC pamphlet being a standard single sheet, two-sided design that was readily compatible with the display mechanism of this survey compared to the tri-fold nature of the ADA pamphlet that was modified to fit into a two page display for this survey. Participants may have also found the IAC pamphlet easier to understand due to increased familiarity with the information it presented.

This is supported by the findings that prior to reading the ADA pamphlet, only 28.3% of parents were aware of the association between HPV and oropharyngeal cancer, whereas 96.4% of parents were familiar with the association between cervical cancer and HPV prior to reading the pamphlets.

Increased child age showed a statistically significant association with decreased parental acceptance after parents read the IAC pamphlet (p=0.030). Possible explanations for this include parents who have already made the decision for their child when initially presented the vaccination when their child was younger. The IAC pamphlet presents material on HPV and the HPV vaccination from the traditional medical perspective that focuses heavily on the sexually-transmissible nature of the virus and on the cancers more closely associated with sex. As children age, their parents may become increasingly aware that they will have sexual encounters, which many parents are opposed to, which may make it difficult for them to accept the vaccination. Future investigation into the link between when parents are more likely to accept the vaccination for their child is imperative as early recommendation and education may be key to improving uptake of the HPV vaccination.

5.3 Did Parents Think It Is Appropriate for Dentists to Discuss the HPV Vaccine with Them for Their Child?

Results showed that most parents (86.2%) take their child to the dentist at least every six months. This fact highlights the opportunities dentists have to give a strong provider recommendation, which is identified as one of the strongest influences on vaccination uptake in

the current literature, of the HPV vaccine when it is coupled with the finding that most parents (80.3%) either agree or strongly agree that it is appropriate for their child's dentist to address the topic of the HPV vaccination with parents. This finding is far higher than the approximately 50% of parents who said they were comfortable with dentists making a vaccine recommendation as reported in Lazalde et al., 2018.[11]

Over half of parents of children 7 to 9 years of age reported taking their child to a pediatric dentist. As child age increased, the percentage of parents who reported taking their child to a pediatric dentist decreased. This trend highlights the importance of ensuring the availability of pamphlets educating parents on the importance of the HPV vaccination at both pediatric and general dentist offices to ensure their distribution to the entire eligible spectrum of children and their parents. When correlated with the trend that younger child age was associated with increased parental acceptance of the vaccination for both the IAC (statistically significant association) and the ADA pamphlets, this provides an area for future outreach to parents for provider recommendation of the vaccination. This study found that only one parent had heard of the HPV vaccination from a dentist, a finding which further highlights and supports the aforementioned conclusion that dentists represent a new base of providers to encourage and recommend vaccination against HPV.

5.4 Were Parents Aware of the Relationship Between Oropharyngeal Cancer and HPV Prior to Reading the ADA Pamphlet?

Only 28.3% of parents (n=43) were aware that HPV is associated with developing oropharyngeal cancer prior to reading the ADA pamphlet. That statistic indicates low awareness of the relationship between dentists and HPV. Defining the role of dentists in the prevention and management of HPV presents a new avenue for increased vaccine uptake in the future. The literature reports dentists also feel they do not know what role they play in the fight against HPV with their patients (Daley, et al).[13] Today, 70-90% of all oropharyngeal cancers are HPV-related (Kepka et al., 2019).[9] Increasing public awareness of this and defining the relationship between dentists and HPV and the disease it causes should help define and expand the role dentists can play in preventing it (Dibble et al., 2019).[13] At a minimum, it opens a path for dentists to be another group that can issue a strong provider recommendation for the vaccine, which, along with strong professional organization endorsement, has been shown to be one of the biggest influencing factors in helping parents to select vaccinations for their children (Walker et al., 2019; Gonik, 2016).[2,10] Government approval for dentist-administered vaccinations has already made great strides during the global Coronavirus pandemic as many states have given dentist the approval to administer vaccinations against COVID-19. This expansion of practice may help pave the way for dentists in administering other routine vaccinations.

Most parents (68.4%; n=104) were accepting of the HPV vaccination for their child after reading at least one of the IAC or ADA pamphlets. As discussed previously, different factors were associated with different levels of acceptance for the IAC and the ADA pamphlets. This

emphasizes the importance of presenting the HPV vaccination to parents from multiple contexts and from multiple sources. If providers are able to influence parents towards accepting the HPV vaccination for their children in any aspect, it is an aspect that should not be ignored.

5.5 Was There a Difference Between Parents' Initial Vaccine Consideration and Their Post-Survey Intention?

Overall, more people were inclined to accept the vaccination for their child in the post-survey question as compared to the initial vaccine consideration question. This comparison is limited in its incongruent wording, with the original question asking parents if they were *considering* the vaccination for their child, and the final question asking parents if they *intend to obtain* the vaccination for their child. The latter connotes a much more committed view of the vaccine than the first question. Despite this, it is encouraging to find that education on the topic as a whole did increase parental acceptance of the HPV vaccination.

5.6 Study Limitations

This study was subject to several potential limitations. As with any survey where participants self-report, there is the possibility of the inaccuracy of their answers. As most of the questions in this survey were opinion based, this limitation is confined primarily to the demographic and baseline information collected in the first portion of the survey. This survey

was also conducted online and was incentivized with a drawing. There is the chance that participants may have selected answers at random in order to complete the survey in order to participate in the drawing. The data collected for this study, however, appear to be predominantly coherent and consistent, thereby suggesting the impact from this potential limitation was minimal.

A significant limitation of this study is its failure to capture the opinions of fathers, as almost exclusively mothers completed the survey. Furthermore, these women were almost all well-educated, white females. This distribution is likely due to the nature of the recruitment method used, which targets members of the University of Pittsburgh and University of Pittsburgh Medical Center workforce. Consequently, this study population is not representative of Pittsburgh nor the general population as a whole.

The findings from the study were also almost entirely descriptive in nature, thereby limiting their impact. Finally, the wording of select questions, specifically, the question concerning whether parents were initially considering the vaccine and their final intention towards the vaccine were limited in their non-parallel wording, so sufficient comparison is difficult to draw across the two questions.

5.7 Future Studies

Follow up studies should include research in a younger demographic asking adults in the first generation of people who received the HPV vaccination beginning in 2006 when it was first released on their views on vaccinating their children. The study could include questions asking

how their own vaccination impacted their views on vaccinating their children. This could be especially effective in elucidating whether or not safety concerns over the vaccination will decrease as a second generation of people begin receiving the vaccine.

6.0 Conclusions

- Parents were significantly more accepting of the Immunization Action Coalition pamphlet presenting HPV and the HPV vaccination from a medical standpoint than they were of the ADA pamphlet presenting HPV and the HPV vaccination from a dental standpoint.
- Increased child age was significantly associated with decreased parental acceptance of the HPV vaccination after reading the Immunization Action Coalition pamphlet.
- Increased parental education was significantly associated with increased parental acceptance of the HPV vaccination after reading the American Dental Associated pamphlet.
- Most parents believe it is appropriate for their child's dentist to address the topic of the HPV vaccination for their child, and dental offices represent a new avenue for dentists to give strong provider recommendations supporting the HPV vaccination to parents.
- Currently, most parents are unaware of the association between HPV and oral cancer, and future education campaigns should target this relationship as a means to promote the HPV vaccination.

Appendix A

Thank you for your interest in our research study.

I am doing a research study in an effort to understand if parents' acceptance of the human papilloma virus vaccination varies when it is presented to them from a dental or a medical perspective. The purpose of this research is to gather data about how parents perceive the human papilloma virus (HPV) vaccination and its suitability for their children between the ages of 7 through 17 years from a dental and medical standpoint.

As part of this research, I am asking parents of children or adolescents aged 7 through 17 years to answer a series of questions via an online survey related to their opinions before and after viewing brochures about the HPV vaccine that you would find in either a medical or a dental office. The survey consists of 27 questions and should take approximately 10-15 minutes to complete. If you have any questions concerning this survey, you may contact Dr. Ilsa West at ilw3@pitt.edu. There are no risks to yourself or others associated with this survey. At the conclusion of this research study, two randomly selected participants will each receive a $50.00 Amazon.com gift card. All who complete this survey will be eligible for this selection process should they choose to participate. Your participation in this study is entirely voluntary, and you may choose to withdraw from the study at any point in time by opting to not complete it. No identifiable information will be collected for this survey, so confidentiality will be maintained. Should you opt to participate in the drawing, you will be asked to submit your name and email already associated with your Pitt+me account, which will be kept separately from the survey data in a secure fashion.

Should you have any questions about this study, you may contact the principal investigator, Dr. Deborah Studen-Pavlovich, at 412-648-8183 for a complete explanation; if there is no answer, please leave a voice message.

Knowing all of this information, would you like to participate in this research study?

- *Yes*
- *No*

Click this link to open your randomly selected survey. Please do not click the SUBMIT button until you have completed the survey in the new window. Once you complete the survey in the new window, click SUBMIT to close this window. Thank you.

Thank you very much for your time.

Please click SUBMIT to end your participation.

Appendix B

Please answer the following questions to the best of your ability.

1) *Are you Male or Female?*
   - *Male*
   - *Female*
   - *Other*
   - *Prefer not to answer*

2) *What is your age?*
   - *25 years or younger*
   - *26-35 years*
   - *36-45 years*
   - *46 years or older*
   - *Prefer not to answer*

3) *What is your race/ethnicity (please select all that apply)*
   - *African American*
   - *Asian-Pacific Islander*
   - *Caucasian*
   - *Hispanic*
   - *Native American*
   - *Other*
   - *Prefer not to answer*

4) *What is the highest level of education you completed?*
   - *Less than High School*
   - *High School/GED*
   - *2-year or 4-year College Degree*
   - *Master's or Doctoral Degree*
   - *Prefer not to answer*

Parents with more than one child in the age range of 7 to 17 years should complete the survey using the information for their youngest eligible child.

5) *What is the age of your child?*
   - *7 to 9 years*
   - *10 to 12 years*
   - *13 to 15 years*
   - *16 to 17 years*

6) *How often does your child typically visit the dentist for check-ups? (If you are undecided between two answers, please choose the more frequent interval.)*
   - *Every 6 months (or approximately twice a year)*
   - *Every 6-12 months (or approximately once a year)*
   - *Every 12-18 months (or approximately less than once a year, but at least every 18 months)*
   - *My child only sees a dentist if there is a problem or issue*
   - *Never*

7) *When you do take your child to the dentist, which of the following do you usually see?*[*]
   - *Pediatric Dentist*
   - *General Dentist*
   - *Other (please specify)*

8) *How do you typically pay for your child's dental appointments? If you have both a primary and secondary insurance, please answer using the primary insurance.*[*]
   - *Private dental insurance*
   - *Medicaid*
   - *CHIP*
   - *Self-pay*

9) *Is your child Male or Female (specifically, the sex assigned at birth)?*
   - *Male*
   - *Female*

[*] This question was not displayed to parents who selected the "never" response in Question 6.
[*] This question was not displayed to parents who selected the "Never" response in Question 6.

10) Human Papilloma Virus (HPV) is associated with (please select all that apply):
- *Lung Cancer*
- *Penile Cancer*
- *Anal Cancer*
- *Cervical Cancer*
- *I am not sure*

11) Have you heard of the HPV vaccination?
- *Yes*
- *No*

12) Where did you hear about the HPV vaccination (please select all that apply)?
- *Pediatrician/Primary Care Provider*
- *Dentist*
- *Other (please specify)*

13) Has your child received the human Papilloma Virus (HPV) vaccination?
- *Yes*[**]
- *No*
- *I don't know*

14) Are you considering the HPV vaccination for your child?
- *Yes*
- *No*
- *Undecided*

Please base your answers to the following questions on the Red Pamphlet shown below. If you would prefer to view the pamphlet as a PDF, please access the link below.

[RED PAMPHLET IS DISPLAYED] (Appendices A.1 and A.2)

15) How likely are you after reading the Red Pamphlet to accept the HPV vaccination for your child?
- *Definitely will not accept*
- *Probably will not accept*
- *Neither likely nor unlikely to accept*
- *Probably will accept*
- *Definitely will accept*
- *Undecided*

[**] Individuals who selected "Yes" were directed out of the remainder of the survey and were counted as complete responses.

16) It is appropriate for a pediatrician or primary care physician to discuss the HPV vaccination for your child with you.
- *Strongly Disagree*
- *Disagree*
- *Neither agree nor disagree*
- *Agree*
- *Strongly Agree*
- *Undecided*

17) The Red Pamphlet provided a good overview of the HPV vaccination and human papilloma virus.
- *Strongly Disagree*
- *Disagree*
- *Neither agree nor disagree*
- *Agree*
- *Strongly Agree*
- *Undecided*

Please base your answers to the following questions on the Green Pamphlet shown below. If you would prefer to view the pamphlet as a PDF, please access the link below.

[GREEN PAMPHLET IS DISPLAYED] (Appendices B.1 and B.2)

18) How likely are you after reading the Green Pamphlet to accept the HPV vaccination for your child?
- *Definitely will not accept*
- *Probably will not accept*
- *Neither likely nor unlikely to accept*
- *Probably will accept*
- *Definitely will accept*
- *Undecided*

19) It is appropriate for a general or pediatric dentist to discuss the HPV vaccination for your child with you.
- *Strongly Disagree*
- *Disagree*
- *Neither agree nor disagree*
- *Agree*
- *Strongly Agree*
- *Undecided*

20) The Green Pamphlet provided a good overview of the HPV vaccination and human papilloma virus.
- *Strongly Disagree*
- *Disagree*
- *Neither agree nor disagree*
- *Agree*
- *Strongly Agree*
- *Undecided*

21) Prior to reading the Green Pamphlet, were you aware that HPV is associated with developing oropharyngeal cancer?
- *Yes*
- *No*

Final Section

22) After reading both pamphlets, do you consider yourself more or less likely to accept the HPV vaccination for your child?
- *Significantly less likely*
- *Less likely*
- *Neither mor or less likely*
- *More likely*
- *Significantly more likely*

23) Which pamphlet more strongly influenced your views (either positively or negatively) on accepting the HPV vaccination for your child?
- *Red Pamphlet*
- *Green Pamphlet*

24) Did either the Red Pamphlet or the Green Pamphlet make you feel more negatively towards accepting the HPV vaccination for your child?
- *Red Pamphlet*
- *Green Pamphlet*
- *Neither pamphlet made me feel negatively towards the HPV vaccination for my child*

25) Which pamphlet was easier to understand?
- *Red Pamphlet*
- *Green Pamphlet*
- *Both pamphlets were equally easy/difficult to read*

26) After reading these pamphlets, do you intend to obtain the HPV vaccination for your child?
- Yes
- No
- I do not know/I am undecided

27) Please select your reason(s) for not vaccinating from the options shown below (check all that apply):
- My child is sexually inactive
- I have concerns about the safety of the vaccine
- My child's primary provider has not made a recommendation concerning the vaccine
- My child is male
- I am concerned the vaccination will encourage my child to engage in sexual activity
- Other (please specify)

Thank you for your participation in this survey. The survey is now complete.

A new window will appear once you exit this survey where you may enter your information if you wish to be entered into the drawing for one of two $50.00 amazon.com gift cards. This is not required, and this survey you just completed will be counted and will be anonymous regardless of whether you enter.

Appendix C Red Pamphlet

Appendix C.1 Red Pamphlet Page One

RED PAMPHLET

Human Papillomavirus

A Parent's Guide to Preteen and Teen HPV Vaccination

HPV

Why vaccinate against HPV at 11 or 12 years of age?

- The vaccine produces better immunity to fight infection when given at younger ages compared with older ages.
- Vaccination for HPV is much more effective at preventing disease and cancer if all doses in the series are administered before someone's first sexual contact.
- Most American men and women who become sexually active will contract at least one type of HPV virus in their lifetime. Vaccination can reduce their risk of HPV infection.
- Most people who become infected with HPV do not even know it.
- HPV is easily spread by skin-to-skin contact during sexual activity. Even if someone does not have sexual intercourse, they can still get HPV.
- People who choose to have only one lifetime sex partner can still get HPV if their partner has had previous partners who were infected.
- The vaccine has been tested in thousands of people around the world and has been proven to have no serious side effects.
- The vaccine is highly effective against HPV types that cause most cervical cancers and also protects against 90 percent of HPV-associated genital warts.

What is HPV?

Human papillomavirus (HPV) is a common family of viruses that causes infection of the skin or mucous membranes of various areas of the body. There are over 100 different types of HPV viruses. Different types of HPV infection affect different areas of the body. For instance, some types of HPV cause warts in the genital area and other types can lead to abnormal cells on the cervix, vulva, anus, penis, mouth, and throat, sometimes leading to cancer.

How common is HPV?

HPV is very common. According to the Centers for Disease Control and Prevention (CDC), most sexually active American men and women will contract at least one type of HPV virus during their lifetime. HPV is considered the most common sexually transmitted infection in the United States. It is the cause of almost all cervical cancers in women and has been linked to the rise of oral cancers in young people in the United States.

How serious is HPV?

HPV is extremely serious. Approximately 79 million Americans are currently infected with HPV, and about 14 million more become infected each year. In the United States, there are nearly 13,000 new cervical cancer cases diagnosed annually, and more than 4,000 women die from cervical cancer every year. Men are affected too. An estimated 11,500 HPV-associated cancer cases occur in American men each year.

How is HPV spread?

The most common ways to get an HPV infection is from vaginal or anal sex with an infected person; however, this is NOT the only way to get HPV. Infection can also be acquired from oral sex and any skin-to-skin contact with areas infected by HPV. It is possible to have HPV and not know it, so a person can unknowingly spread HPV to another person.

CONTINUED ON NEXT PAGE ▶

IMMUNIZATION ACTION COALITION Saint Paul, Minnesota • 651-647-9009 • www.vaccineinformation.org • www.immunize.org

Appendix C.2 Red Pamphlet Page 2

RED PAMPHLET

Resources for more information

- Your healthcare provider or local health department
- CDC's information on vaccines and immunization: www.cdc.gov/vaccines
- Immunization Action Coalition's vaccine information website: www.vaccineinformation.org
- Vaccine Education Center at the Children's Hospital of Philadelphia: www.chop.edu/vaccine
- CDC's Vaccines For Children (VFC) program: www.cdc.gov/vaccines/programs/vfc/index.html

SOURCES

American College of Obstetricians and Gynecologists (ACOG) Committee on Adolescent Health Care. Fact Sheet: Human Papillomavirus. ■ www.acog.org

Centers for Disease Control and Prevention (CDC). National Center for Chronic Disease Prevention and Health Promotion. HPV and Cancer. ■ www.cdc.gov/hpv/parents/cancer.html

CDC. National Center for Emerging and Zoonotic Infectious Diseases. Vaccine Safety: Human Papillomavirus Vaccine. ■ www.cdc.gov/vaccinesafety/Vaccines/HPV-vaccine.html

CDC. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Genital HPV Infection Fact Sheet. ■ www.cdc.gov/std/HPV/STDFact-HPV.htm

CDC. National Center for Immunization and Respiratory Diseases. HPV Vaccine-Questions and Answers. ■ www.cdc.gov/hpv/parents/questions-answers.html

CDC. National Center for Immunization and Respiratory Diseases. Preteens and Teens Need Vaccines Too! ■ www.cdc.gov/Features/PreteenVaccines/index.html

Reduction in human papillomavirus (HPV) prevalence among young women following HPV vaccine introduction in the United States, National Health and Nutrition Examination Surveys, 2003-2010. *J Infect Dis.* 2013 Aug 1; 208(3):385-93.

Talk to your health-care provider today about protecting your son or daughter from HPV infection!

Can HPV infection be treated?

There is no treatment for HPV infection; there are only treatments available for the health problems that HPV can cause, such as genital warts, cervical changes, and cancer. In some cases, the body fights off the virus naturally. In cases where the virus cannot be fought off naturally, the person is at risk for serious complications, including cancer.

What is HPV vaccine?

Gardasil 9 is the only HPV vaccine currently being distributed in the United States. Gardasil 9 protects against cervical cancers in women and also against genital warts and cancers of the anus, penis, vagina, vulva, mouth, and throat. For preteens, HPV vaccine is given in two shots, separated by 6 to 12 months. It is important to get all the recommended doses to get the best protection.

At what age should my son or daughter get HPV vaccine?

Routine vaccination with HPV vaccine is recommended for all 11- and 12-year-old boys and girls. The vaccine can be given as early as 9 years of age. If your son or daughter did not receive the two doses of vaccine at the recommended age, they should still start or complete their HPV vaccine series. Your son can be given the vaccine through the age of 21 (and also certain males through age 26 years), and your daughter can be given the vaccine through the age of 26. If the vaccine series is started at age 15 years or older or, if the person has problems with their immune system, three doses are necessary. Check with your healthcare provider to make sure your child is up to date with HPV vaccination.

For HPV vaccine to work best, it is very important for preteens to get all the recommended doses before any sexual activity begins. It is possible to get infected with HPV the very first time they have sexual contact with another person, even if they do not have intercourse. Also, the vaccine produces better immunity to fight infection when given at the younger ages compared to the older ages.

Are HPV vaccines safe?

HPV vaccine has been shown to be very safe. Every vaccine used in the United States is required to go through rigorous safety testing before licensure by the FDA. The HPV vaccine has been extensively tested in clinical trials with more than 28,000 male and female participants. Since the first HPV vaccine was licensed for use in 2006, more than 50 million doses of HPV vaccine have been distributed in the United States. Now in routine use, the vaccine is continually monitored for safety.

In the years of HPV vaccine safety monitoring, no serious safety concerns have been identified. Like other vaccinations, most side effects from HPV vaccination are mild, including fever, headache, and pain and redness in the arm where the shot was given.

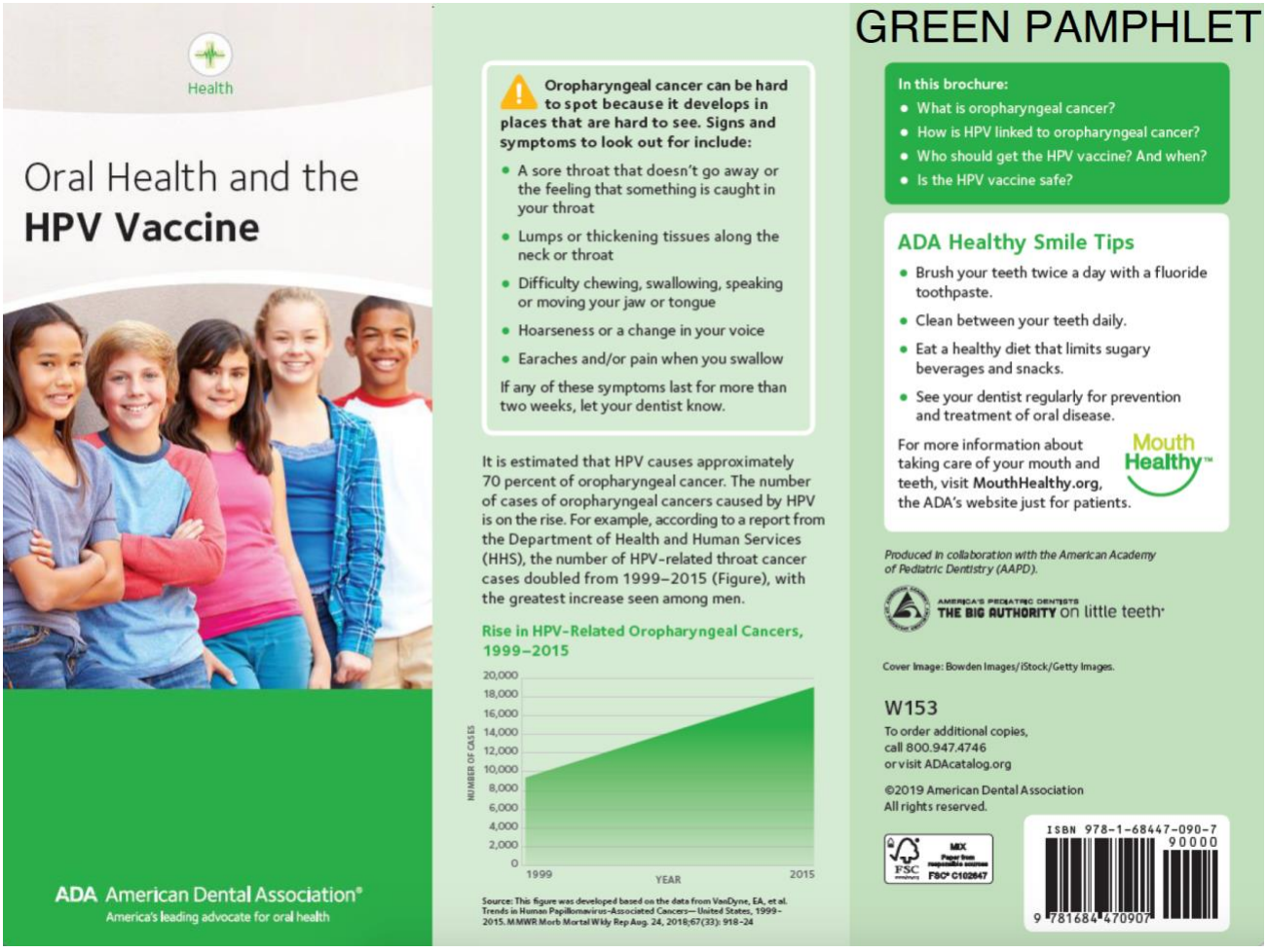
Is HPV vaccine effective?

The vaccine has been shown to be highly effective in protecting against the HPV types targeted by the vaccine. A study looking at HPV infections in girls and women before and after the introduction of HPV vaccines shows a significant reduction in vaccine-type HPV in U.S. teens since the vaccine was introduced.

Adapted from a publication developed by the Michigan Department of Community Health, Division of Immunization

Appendix D Green Pamphlet

Appendix D.1 Green Pamphlet Page One



Appendix D.2 Green Pamphlet Page Two

GREEN PAMPHLET

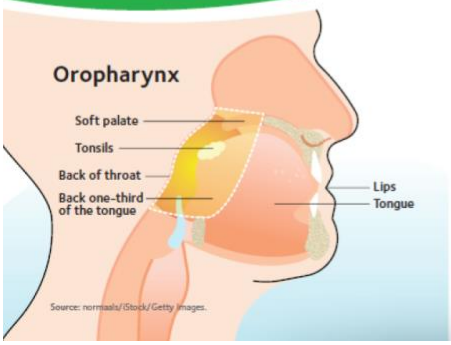
Infection with the human papillomavirus (HPV) is very common. According to the Centers for Disease Control and Prevention (CDC), 79 million Americans are infected with HPV. Most of the time, HPV infections clear up without causing any major problems. But, sometimes the virus stays in the body and may cause cancer later in life.

HPV vaccination is the best way to prevent HPV infections. The HPV vaccine helps protect against infection from a virus that may lead to cancer.

Oropharyngeal Cancer and HPV

HPV is the leading cause of **oropharyngeal (or-oh-FARE-in-jee-al)** cancer. Oropharyngeal cancer is a type of head and neck cancer that develops near the back of the mouth and throat (Figure), in places like the

- back or base of the tongue
- soft part of the roof of the mouth (soft palate)
- tonsils



Source: normaals/iStock/Getty Images.

HPV Vaccine

The HPV vaccine was first offered to girls in 2006, and since that time, there has been a significant drop in HPV infections among teenage girls. Now offered to both boys and girls, experts say the HPV vaccine could prevent nearly 90 percent of HPV-related cancers in the United States.

HPV-related cancers develop years after a person is infected with the virus. Getting the vaccination as young as recommended is the best way to protect against the virus. The HPV vaccination can help protect older children and some adults, though an additional dose might be needed (Table).

The CDC recommends that

- Children aged 11–12 years, who do not have health conditions that make it difficult to fight infections, should get two doses of the vaccine.
- Males aged 15–21 years and females aged 15–26 years, who have not been vaccinated, should get three doses of the vaccine.
- Individuals aged 9–26 years, who have a health condition that makes it difficult to fight infections, should get three doses of the vaccine.

HPV Vaccine Safety

- The US Food and Drug Administration (FDA) and the CDC monitor and report harmful side effects related to HPV vaccines. To date, most side effects reported are mild and similar to other vaccines.
- The CDC reports that the vaccine is safe, with more than 100 million doses given in the United States since 2006.
- The American Dental Association (ADA) and American Academy of Pediatric Dentistry (AAPD) encourage dentists to support and recommend the use of the HPV vaccine.

Experts say the HPV vaccine could prevent nearly 90 percent of HPV-related cancers in the United States.

Table. When to Get the HPV Vaccine

Who Should Get It	# of Doses	When It Should Be Given
Children aged 11–12 years, who do not have health conditions that make it difficult to fight infections*	2	Second dose: 6–12 months after the first
Males aged 15–21 years and females aged 15–26 years, who have not been vaccinated†	3	Second dose: 1–2 months after the first Third dose: 6 months after the first
Children or young adults with lowered immunity aged 9–26 years†‡	3	Second dose: 1–2 months after the first Third dose: 6 months after the first

* The routine recommendation is for children 11–12, but the two-dose vaccine can be started in children aged 9–14 years.
† The US Food and Drug Administration has approved the vaccine for people up to 45 years of age.
‡ Talk to your physician about conditions that fit into this category.

Source: CDC. 2019. Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2019. *https://www.cdc.gov/vaccines/schedules/hcp/imz/child-adolescent.html*; CDC. 2019. Recommended Adult Immunization Schedule for ages 19 years or older, United States, 2019. *https://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html*.

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